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Sexological Notes on the Landsnail *Oreohelix*

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Few observations of the courtship, coitus, or sex-organ-functioning of any species, of *Oreohelix* seem yet to have been reported. However, Roscoe (1950) has given an observation of a pair of *Oreohelix howardi* Jones, reporting that the insemination was mutual. For the opportunity of making such studies on *Oreohelix strigosa* (Gould), I am indebted to Harold W. Harry who criticized the manuscript and shared with me specimens which were collected near Salt Lake, Utah, by Don Myers. The snails were kept under group-culture in cardboard cartons; further information on the methods used is available in a prior paper (Webb, 1947). All of the following observations are of captive specimens.

Pairing. This was first observed July 31, 1947. At this time one snail was seen clinging over the aperture of another with the foreparts bent down over the anterior part of the other's extended body. The upper snail then brushed the partly everted penis against the foot of the lower snail, failed to contact the atrial area, and then rotated clockwise on the other's spire and re-attained the position over the aperture. Again it exserted the penis and tried to copulate with the lower snail. At this time the penis was moderately well everted and strongly swollen, but was retracted, and the snail once more maneuvered over the spire of the lower snail. Again the snail extended itself downward everted the penis, and tried to engage the lower snail. Believing that coition was occurring, **I** killed the pair; upon dissection, the penis of the upper snail was found to be partly everted, but the genitalia of the lower snail were too immature to have abetted coition. The male-acting upper snail thus had been making sexual advances toward a sexually immature animal.

On June 9, 1948, further details were noted. Again one snail was on another's spire with the foreparts thrust down and with the mouth positioned

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slightly behind the genital pore of the lower snail which had slightly uplifted the front of the foot. Next the upper snail's penis was exserted about 2 mm., and the snail's slight forward movement caused the organ to touch the rim of the other's atrial pore. The penis was moved then toward the center of the pore, and at 5:55 A. M. coitus began. At 6:00 A. M. the upper snail was noted to be gnawing at the foot of the other which, in defense, progressively withdrew into the shell, but coition continued. At 6:11 A. M. the upper one was still gnawing at the non-retracted posterior part of the other's foot, but at 6:55 A. M. they disengaged from coitus. No attempt was made by the female-acting snail to mount its former partner; thus coitus was quite non-reciprocal. A typical mating posture is shown in Figure 1.

Coitus-duration. In this pair coitus lasted thus about one hour, and so likewise in another couple wherein coitus was observed to begin at 12:10 A. M. The snails were yet engaged at 1:00 P. M., but had separated by 1:20 P. M. (The anatomy of the female-acting specimen is shown in Figures 5 and 6, the penis being severed from the rest of the organs.)

Non-reciprocality. Coition has been non-reciprocal in all of the matings observed, as has been verified many times by the separation of copulating snails by hand. In every such instance the penis of the upper snail was found to be engaged in the feebly everted female-organ (Fig. 2, female, and Fig. 7). In this non-reciprocality *Oreohelix strigosa* is unlike most of the sexolcgically known helicoid snails which exhibit reciprocal coitus almost entirely. Presumably each individual is capable of acting as either male or female because the mating-anatomies secured (Fig. 4, 5, and 6) clearly show male-acting individuals that recently have been inseminated and female-acting individuals that exhibit un-ejected spermatophores within the penis.

Anatomical data. Penis. The fully everted penis (p) is shown in Figure 2, male, and Figure 7, and the partially everted penis in Figure 4, as recovered from mating-anatomies of two male-acting snails. The transition from the smooth basal part of the penis to the densely papillose remainder is indicated in Figure 4 by a "t"; the slight adherent mass (?) is seemingly mucus, and a spermatophore (s) is visible in the epiphallus within the smooth part of the penis; another is shown entering the spermathecal duct. The organs as shown are not fully everted, and the contained spermatophore possibly would have been borne to the exterior by a further eversion of the papillose part of the upper penis; however, the position of a spermatophore (s) in the penis (Fig. 5) of a female-acting snail indicates that the spermatophore may move from the epiphallus prior to coition. Were a second spermatophore to have been in process of formation within the epiphallus, as seemingly shown in

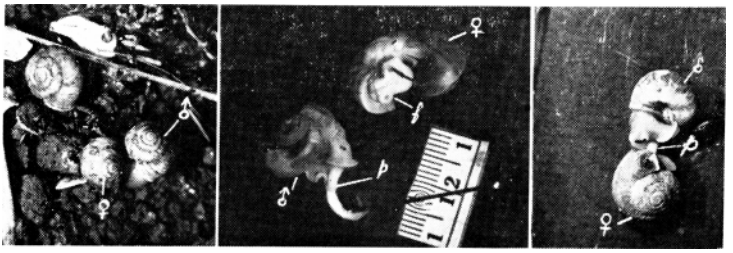

Figure 1. A pair of Oreohelix strigosa in coitus; sex symbols show the respective roles of the bisexual individuals.

Figure 2. A pair of mating-anatomies; note the female-organ (f) and the penis (p). Scale a mm. rule.

Figure 3. One of a copulating pair inverted to show the penis (p).

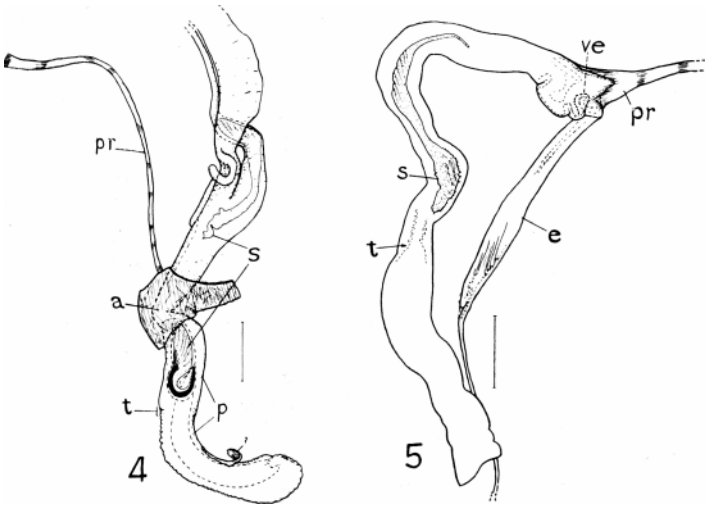

Figure 4. Incompletely everted sex-organs of a male-acting snail; a, atrium; p, penis; pr, penis-retractor; s, spermatophore; t, transition point between smooth and papillose part of penis. Scale = 2 mm.

Figure 5. The penis of a post-coitus anatomy of a female-acting snail; note the verge *(ye)* and ridges in the epiphallus (e). Scale line = 2 mm.

Figure 4, then the descended first spermatophore would have been ejected when coition occurred to leave a spermatophore within the epiphallus as shown.

A slight, curved verge is present at the point where the epiphallus enters the penis (Fig. 5, ve). As *Oreohelix* has hitherto been characterized as being verge-less, I have also verified the presence of a verge in a freshly, drowned specimen—the verge being clearly present within the tip of the thin, well-extended penis even before the organs were cleared in xylol. The many other kinds of *Oreohelix* should be studied to discover if a verge is characteristic or ubiquitous.

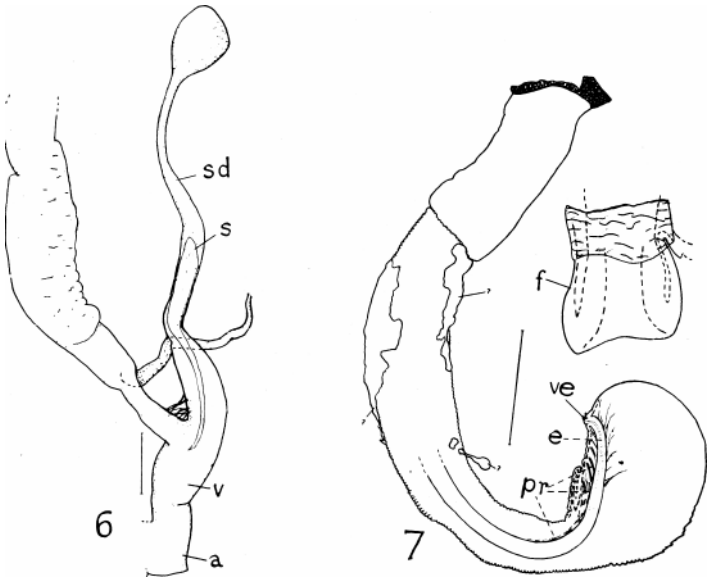

Figure 6. The rest of the anatomy of Figure 5; note the position of the recently received spermatophore (s). sd, spermathecal duct; v, vagina. Scale line . 2 mm.

Figure 7. The fully everted penis showing descended, internally situated epiphallus (e) and externally situated verge (ve). Above is shown the everted female-organ (f). Scale line 2 mm.

The fully everted penis (Fig. 7) clearly shows the verge as a slight prominence through which the lumen of the epiphallus penetrates; strands from the penis-retractor muscle (pr) maintain the orientation of the descended epiphallus (e) now internally situated. The everted female-organ (f) is shown adjacently and is from the female-acting snail of the pair. The folds in the

penis-tip, as shown in Figure 5, are nearly all lost in the fully turgesced, everted organ except one pouch-like sac (which may be abnormal). The papillae of the fully everted penis-tip seem stretched into invisibility, but such may truly be lacking. Mucus seems present on part of the organ, but the spermatophore had been ejected and was noted in the spermathecal duct of the female-acting snail.

Spermatophore. As in Figure 4, the similarity of the markings on the spermatophore to the linear folds within the tip of the epiphallus (Fig. 5, e) clearly indicates that the somewhat soft yet shape-retaining spermatophore is probably formed in the epiphallus.

Female-organ. In the mating-anatomies of female-acting specimens, a slight collar-like female-organ (Fig. 2, f) was found to be present. The female-organ protrudes only about 1-2 mm. and probably results from the eversion of the atrium and perhaps some of the lower vagina. In every instance the penis became disunited in killed snails and was never recovered in the position of coitus. The position of the spermatophore in post-coitus anatomies indicates that the penis is inserted into the vagina and probably also somewhat into the basal part of the expanded spermathecal duct (Fig. 6) .

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